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PERGAMON

Behaviour Research and Therapy 39 (2001) 1051–1061

BEHAVIOUR RESEARCH AND THERAPY

www.elsevier.com/locate/brat

Anxiety and depression as correlates of self-reported behavioural inhibition in normal adolescents

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Accepted 8 May 2000

Abstract

In a previous study, Muris, Merckelbach, Wessel, and Van de Ven [Psychopathological correlates of self-reported behavioural inhibition in normal children. *Behav. Res. Ther.* 37 (1999) 575–584] found that children who defined themselves as high on behavioural inhibition displayed elevated levels of psychopathological symptoms compared to children who defined themselves as low or middle on behavioural inhibition. The present study further examined the relationship between self-reported behavioural inhibition and anxiety disorders and depression symptoms in a large sample of adolescents aged 12–18 years (*N*=968). Adolescents completed a measure of behavioural inhibition and questionnaires of anxiety and depression. Results indicated that adolescents who classified themselves as high on behavioural inhibition had higher scores of anxiety and depression than adolescents who classified themselves as low or middle on behavioural inhibition. Structural equations modelling was employed to test hypothetical models on the role of behavioural inhibition in childhood anxiety and depression. It was found that a pathway in which behavioural inhibition results in anxiety, which in turn leads to depression, provided the best fit for the data.

Keywords: Behavioural inhibition; Anxiety; Depression; Adolescents

1. Introduction

Some children and adolescents are characterised by a behaviourally inhibited temperament (Kagan, Reznick, & Snidman, 1988). In infancy, these children are irritable, and in childhood

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0005-7967/01/$ - see front matter
PII: S0005-7967(00)00081-4

they tend to be unusually shy and to react with fear and withdrawal in novel and/or unfamiliar social situations (e.g. Kagan, Reznick, & Snidman, 1987). Behavioural inhibition remains relatively stable from early to middle and late childhood (Kagan et al., 1988; Scarpa, Raine, Venables, & Mednick, 1995; Gest, 1997), although it should be noted that this behavioural pattern is unremittingly present in only 10% of children who manifest it in its extreme and who show a high and stable heart rate (see Turner, Beidel, & Wolff, 1996). Research has shown that these children seem to be at risk for developing anxiety disorders. Evidence for this comes from a study by Biederman and colleagues (1993). In this study, pre-school children were followed for a 3-year period. Results showed that children initially identified as behaviourally inhibited were subsequently more likely to develop anxiety disorders compared to control children (i.e. children who at study onset were not classified as behaviourally inhibited). Not only social phobia but also separation anxiety disorder and multiple anxiety disorders were significantly more prevalent in the subsample with behavioural inhibition. The Biederman et al. (1993) study also found that in the group of inhibited children, the rates of all anxiety disorders increased markedly from baseline to follow-up (for a review of behavioural inhibition studies in pre-school children, see Biederman, Rosenbaum, Chaloff, & Kagan, 1995).

Few studies have examined the relationship between behavioural inhibition and anxiety and other psychopathological symptoms in older children. One exception is a recent study by Muris and colleagues (1999). In that study, normal children (N=152) aged 12 to 14 years were provided with a definition of behavioural inhibition and then asked to classify themselves as either low, middle, or high on behavioural inhibition. In addition, children completed measures of anxiety disorders symptoms and depression. Results indicated that children who scored high on behavioural inhibition were found to have higher levels of anxiety and depression compared to children who classified themselves as low or middle on behavioural inhibition. Moreover, children high on behavioural inhibition more frequently exhibited (multiple) anxiety disorders symptoms in the subclinical range.

In their critical review on the relationship between behavioural inhibition and anxiety disorders, Turner and colleagues (1996, pp. 170–171) have rightly remarked that "BI [behavioural inhibition] might represent one, but not the only, factor associated with the development of anxiety disorders. That is, BI is neither necessary nor sufficient for the development of anxiety disorders, although the presence of BI may make an individual more vulnerable to the development of these disorders." To date, the most likely interpretation of the relationship between behavioural inhibition and anxiety disorders is that behavioural inhibition is one manifestation of a genetic vulnerability factor, such as neuroticism or trait anxiety, which in interaction with negative environmental influences (e.g. stressful life events, parental rearing, and specific learning experiences) may produce an anxiety disorder (see Craske, 1997; Muris & Merckelbach, 2000; Turner et al., 1996).

So far, research has emphasised that behavioural inhibition is a risk factor for developing childhood anxiety disorders. In considering future directions in research on behavioural inhibition, Biederman et al. (1995, p. 77) comment on the specificity of the association between behavioural inhibition and anxiety: "Is behavioural inhibition in children specifically or exclusively antecedent to anxiety disorder as opposed to other psychopathology . . . ?" Note in passing that in the Muris et al. (1999) study, behaviourally inhibited children also displayed elevated levels of depression. Thus, it remains possible that behavioural inhibition not only serves as an antecedent for anxiety disorders but is also directly involved in the aetiology of childhood depression. Another possibility

is that the connection between behavioural inhibition and depression is carried by anxiety. In a recent longitudinal study, Cole, Peeke, Martin, Truglio, and Seroczynski (1998) found that high levels of anxiety at one point in time predicted high levels of depression at a subsequent point in time even when controlling for prior levels of depression. This result indicates that depression in children is a consequence of high levels of anxiety. Thus, according to this line of reasoning, behavioural inhibition leads to anxiety which in turn results in depression.

The current study further examined the connection between self-reported behavioural inhibition, on the one hand, and anxiety and depression, on the other hand, in a large sample of 968 adolescents. Two measures of behavioural inhibition were used. First, adolescents answered a set of questions about typical behavioural inhibition features. Second, they were provided with a definition of behavioural inhibition and then asked to classify themselves as low, middle, or high on behavioural inhibition. In addition, adolescents completed the Spence Children's Anxiety Scale (SCAS; Spence, 1997; Spence, 1998), a questionnaire designed to measure anxiety disorders symptoms in terms of the Diagnostic and Statistical Manual of Mental Disorders (DSM; American Psychiatric Association, 1994) and the Children's Depression Inventory (CDI; Kovacs, 1981), a commonly used measure of depressive symptoms. It was investigated whether self-reported behavioural inhibition was positively associated with symptoms of anxiety disorders and depression. Furthermore, structural equations modelling was used to explore the role of behavioural inhibition in the radicalisation of anxiety and depression symptoms. Four plausible models were tested. In the first model, behavioural inhibition leads to both anxiety disorders symptoms and depression (BI→Anxiety and Depression). In the second model, behavioural inhibition causes anxiety disorders symptoms which, in turn, results in depression (BI→Anxiety→Depression). In the third model, behavioural inhibition leads to depression which, in turn, results in anxiety disorders symptoms (BI→Depression→Anxiety). The fourth and final model tested whether behavioural inhibition is an antecedent of anxiety disorder symptoms or a consequence of such symptoms. In this model, anxiety leads to behavioural inhibition, which in its turn causes depression (Anxiety→BI→Depression). On the basis of previous research on the connection between behavioural inhibition and psychopathology, it was expected that either the first or the second model would provide the best fit of the data.

2. Method

2.1. Participants

Nine hundred and sixty-eight adolescents (496 boys and 472 girls; mean age 14.2 years, SD=1.4; range 12–18 years) were recruited from a regular secondary school in Stein/Beek (Limburg), The Netherlands. No exact information about the socio-economic background, ethnicity, and family structure of the adolescents was available. On the basis of information provided by the staff of the school, the percentages of adolescents with low, middle, and upper socio-economic background were estimated at 25%, 50%, and 25%, respectively. Most of the adolescents (more than 90%) were Caucasian, and approximately 7% of the adolescents came from divorced families.

Informed consent was obtained from parents and adolescents before participation in the study.

More than 95% of the parents and adolescents who were approached to take part in the study agreed to participate.

2.2. Procedure

Adolescents were asked to complete the questionnaires (see below) in their classrooms. The teacher and a research assistant were always present to help participants if necessary and to ensure confidential and independent responding.

2.3. Questionnaires

The behavioural inhibition form consisted of two parts. The first part was the Behavioural Inhibition Scale (BIS; see Gest, 1997; Muris et al., 1999) which consists of four items: shyness ("I am shy when I have to talk to an unfamiliar person"), communication ("I talk easily to an unfamiliar person"), fearfulness ("I feel nervous when I have to talk to an unfamiliar person"), and smiling ("I feel good and I am able to laugh, when I talk to an unfamiliar person"). Each item is rated on a 4-point Likert scale with 1=*never*, 2=*sometimes*, 3=*often*, and 4=*always*. After recoding the positive items, scores are summed to yield a total BIS score ranging from 4 (not apprehensive, not shy and very sociable when meeting an unfamiliar person) to 16 (very apprehensive and shy and not capable of initiating social interaction with an unfamiliar person). The second part of the behavioural inhibition form provided the adolescents with three descriptions: (1) "As long as I remember, I am shy when I have to talk to an unfamiliar person. On such occasions, I am nervous, I am not able to laugh, and I do not know what to say" (high behavioural inhibition), (2) "As long as I remember, I talk easily to an unfamiliar person. On such occasions, I feel good, I am able to laugh and I know precisely what I have to say" (low behavioural inhibition), and (3) "I am someone falling in between 1 and 2" (middle behavioural inhibition). Adolescents were asked to assign themselves to one of these three behavioural inhibition categories.

The SCAS (Spence 1997, 1998) is a self-report questionnaire measuring DSM-defined anxiety disorders symptoms in children and adolescents. The scale contains 38 items that can be allocated to the following subscales: generalised anxiety disorder (6 items; e.g. "I worry that something bad will happen"), separation anxiety disorder (6 items; e.g. "I feel scared when I have to sleep on my own"), social phobia (6 items; e.g. "I feel afraid that I will make a fool of myself in front of people"), panic disorder and agoraphobia (9 items; e.g. "All of a sudden I feel really scared for no reason at all", "I am afraid of being in crowded places"), obsessive–compulsive disorder (6 items; e.g. "I have to think of special thoughts to stop bad things from happening"), and fears of physical injury replacing specific phobias (5 items; e.g. "I am scared of dogs"). SCAS items are rated on 4-point scales: *never*, *sometimes*, *often*, or *always*. These are scored 0, 1, 2, and 3, respectively. SCAS total and subscale scores are computed by summing across relevant items.

The CDI (Kovacs, 1981) is a commonly used self-report measure of depression symptoms in children and adolescents 7 to 17 years of age. The scale has 27 items dealing with sadness, self-blame, loss of appetite, insomnia, interpersonal relationships, and school adjustment. Each CDI item consists of three alternatives of increasing severity. Children are asked to choose the statement that best applies to them. Items are scored 0, 1, or 2 with high scores reflecting more severe depression. The total CDI score is calculated by summing all item scores.

2.4. Statistical analyses

The Statistical Package for Social Sciences (SPSS) was used for computing descriptive statistics, correlations, and carrying out the analyses of variance. The structural equations modelling program EQS (Bentler, 1989) was used to test the models on the role of behavioural inhibition in the radicalisation of anxiety and depression symptoms. EQS combines multiple regression and path analysis and produces several goodness-of-fit indices indicating how well the tested model accounts for the observed correlational structure of the data. In the present study, the following indices were used: (1) the Chi square (χ^2) goodness-of-fit index which is required to be non-significant for the tested model to provide a good fit for the data, (2) the Average off Absolute Standardised Residuals (AASR) which should not exceed 0.05 for the model to fit the data well, (3) Akaike's Information Criterion (AIC) is a relative measure—that is to say, the model with the lowest value provides the best fit, and (4) the Comparative Fit Index (CFI) which should be higher than 0.90 for a good model fit.

3. Results

3.1. General findings

The left panel of Table 1 displays descriptive statistics for the various questionnaires used in the current study. All questionnaires were found to have sufficient internal consistency. Cronbach's alphas were 0.72 for BIS, 0.83 for CDI, and varied between 0.60 (fears of physical injury)

Table 1
Descriptive statistics (means, standard deviations, gender differences, and Cronbach's alphas) for BIS, SCAS, and CDI (left) and correlations (corrected for gender) among various questionnaires (right)

		Total group (N=968)	Boys (n=496)	Girls (n=472)	α	BIS	CDI
BIS		8.9 (2.3)	8.6 (2.2)	9.2 (2.3)[a]	0.72		
CDI		5.2 (7.3)	4.4 (6.8)	6.0 (7.8)[a]	0.83	0.20*	
SCAS							
	Total score	14.3 (10.5)	11.6 (9.0)	17.1 (11.2)[a]	0.91	0.36*	0.58*
	Generalised anxiety disorder	3.9 (2.4)	3.3 (2.2)	4.4 (2.5)[a]	0.74	0.31*	0.50*
	Separation anxiety disorder	1.5 (1.6)	1.1 (1.4)	1.8 (1.7)[a]	0.62	0.21*	0.39*
	Social phobia	2.9 (2.3)	2.5 (2.1)	3.4 (2.4)[a]	0.67	0.40*	0.45*
	Panic disorder and agoraphobia	1.8 (2.6)	1.3 (2.1)	2.3 (2.9)[a]	0.77	0.28*	0.55*
	Obsessive–compulsive disorder	2.3 (2.4)	2.1 (2.3)	2.4 (2.5)	0.72	0.20*	0.49*
	Fears of physical injury	2.0 (2.1)	1.3 (1.6)	2.8 (2.2)	0.60	0.26*	0.29*

Notes. BIS, Behavioural Inhibition Scale; SCAS, Spence Children's Anxiety Scale; CDI, Children's Depression Inventory. [a]Significant gender difference at $P<0.005$. *$P<0.001$.

and 0.91 (total score) for the various SCAS scales. Furthermore, *t*-tests revealed significant gender differences for BIS [$t(966)=4.4$, $P<0.001$], CDI [$t(932.4$, adjusted $df)=3.3$, $P<0.005$], SCAS total score [$t(901.8$, adjusted $df)=8.4$, $P<0.001$], generalised anxiety disorder [$t(930.6$, adjusted $df)=7.3$, $P<0.001$], separation anxiety disorder [$t(902.2$, adjusted $df)=7.2$, $P<0.001$], social phobia [$t(935.9$, adjusted $df)=5.8$, $P<0.001$], panic disorder and agoraphobia [$t(858.4$, adjusted $df)=6.3$, $P<0.001$], and fears of physical injury [$t(840.5$, adjusted $df)=12.3$, $P<0.001$]. As can be seen in Table 1, girls exhibited higher levels of behavioural inhibition, depression, and anxiety symptoms than boys did. In passing, it should be noted that no appreciable associations between age and any of the measures were found. Only the negative correlation between age and SCAS separation anxiety disorder reached statistical significance: $r=-0.08$, $P<0.05$, indicating that these anxiety symptoms declined slightly with age.

3.2. Correlations among questionnaires

The right panel of Table 1 shows correlations (corrected for gender) among BIS, CDI, and SCAS scales. Two conclusions can be drawn from this correlational matrix. First, modest but significant positive associations were found between behavioural inhibition as indexed by the BIS, on the one hand, and anxiety disorders and depression symptoms, on the other hand. Thus, high levels of behavioural inhibition were accompanied by high levels of anxiety and depression. Second, anxiety and depression were found to be substantially correlated [with *r*-values between 0.29 (fears of physical injury) and 0.58 (total score)]. In other words, high levels of anxiety disorders symptoms were associated with high levels of depression.

3.3. Behavioural inhibition and anxiety/depression

The number (percentage) of adolescents who classified themselves as either low, middle, or high behavioural inhibited was 261 (27.0%), 630 (65.1%), and 77 (8.0%), respectively. There was an unequal distribution of boys and girls among the three behavioural inhibition groups [$\chi^2(2)=27.4$, $P<0.001$]. The number (percentage) of boys and girls was 169 (64.8%) and 92 (35.2%) in the low behavioural inhibition group, 296 (47.0%) and 334 (53.0%) in the middle behavioural inhibition group, and 31 (40.3%) and 46 (59.7%) in the high behavioural inhibition group. Girls more frequently defined themselves as middle or high on behavioural inhibition than boys.

To evaluate the anxiety/depression levels of the three behavioural inhibition groups, a series of 2 (gender) × 3 (group: low/middle/high behavioural inhibition) analyses of variance (ANOVAs) was carried out. These analyses revealed a consistent pattern of results (see Table 2). First, a significant main effect of group was found for BIS. As expected, adolescents who classified themselves as low on behavioural inhibition scored relatively low on the BIS, adolescents who classified themselves as high on behavioural inhibition scored relatively high on the BIS, whereas adolescents who classified themselves as middle on behavioural inhibition scored in between. Second, and most importantly, significant main effects of group were found for all anxiety disorder and depression measures. In most cases, post-hoc tests revealed a linear association between behavioural inhibition and anxiety disorders and depression symptoms. That is, adolescents low on behavioural inhibition had the lowest anxiety/depression scores, adolescents high on behavioural

Table 2
Means and standard deviations (calculated per gender) for the low, middle, and high behavioural inhibition groups. Results of the main 2 (gender) × 3 (groups) ANOVAs are shown in the right columns of the table

	Low behavioural inhibition			Middle behavioural inhibition			High behavioural inhibition			ANOVAs (*F* values)			
	Total (*N*=261)	Boys (*n*=169)	Girls (*n*=92)	Total (*N*=630)	Boys (*n*=296)	Girls (*n*=334)	Total (*N*=77)	Boys (*n*=31)	Girls (*n*=46)	Group	Gender	Interaction	Post-hoc tests[b]
BIS	6.8 (1.9)	6.9 (1.9)	6.7 (1.9)	9.4 (1.6)	9.2 (1.5)	9.5 (1.6)	12.4 (1.8)	12.4 (1.8)	12.4 (1.9)	376.2***	0.0	2.1	H>M>L
CDI	3.8 (5.2)	3.0 (4.2)	5.0 (6.4)	5.2 (7.4)	5.0 (7.8)	5.4 (7.0)	10.4 (10.4)	6.8 (7.0)	12.8 (11.4)	19.0***	18.2***	5.9**	H>M>L
SCAS													
Total score	10.5 (8.8)	8.6 (6.5)	13.8 (11.3)	14.5 (9.7)	12.3 (9.0)	16.5 (9.9)	24.9 (13.8)	20.7 (12.8)	27.7 (13.9)	51.5***	37.8***	0.8	H>M>L
Total score[a]	8.6 (7.6)	7.0 (5.4)	11.5 (9.9)	11.5 (8.2)	9.5 (7.4)	13.3 (8.5)	19.3 (12.0)	16.3 (11.6)	21.3 (12.0)	38.4***	34.0***	0.3	H>M>L
Generalised anxiety disorder	3.0 (2.2)	2.6 (1.8)	3.8 (2.5)	3.9 (2.3)	3.5 (2.2)	4.3 (2.3)	5.9 (2.9)	5.3 (2.6)	6.4 (3.0)	37.5***	24.3***	0.6	H>M>L
Separation anxiety disorder	1.1 (1.4)	0.9 (1.1)	1.5 (1.8)	1.5 (1.5)	1.1 (1.4)	1.8 (1.6)	2.4 (2.0)	1.9 (1.9)	2.7 (2.0)	13.6***	24.6***	0.1	H>M>L
Social phobia	1.9 (1.7)	1.7 (1.6)	2.3 (1.9)	3.0 (2.2)	2.8 (2.2)	3.2 (2.2)	5.6 (2.8)	4.4 (2.4)	6.4 (2.7)	76.4***	29.0***	4.8**	H>M>L
Panic disorder and agoraphobia	1.2 (2.3)	0.8 (1.3)	2.0 (3.2)	1.8 (2.4)	1.4 (2.1)	2.1 (2.6)	3.9 (4.2)	3.1 (4.4)	4.4 (4.0)	25.8***	22.2***	1.0	H>M>L
Obsessive–compulsive disorder	2.0 (2.2)	1.9 (2.0)	2.2 (2.6)	2.2 (2.4)	2.1 (2.4)	2.2 (2.4)	3.8 (2.9)	3.6 (2.8)	4.0 (3.1)	17.5***	1.2	0.2	H>M,L
Fears of physical injury	1.2 (1.6)	0.8 (1.1)	2.0 (2.0)	2.2 (2.0)	1.4 (1.6)	2.0 (2.0)	3.3 (2.5)	2.4 (2.3)	3.9 (2.6)	29.6***	63.6***	0.3	H>M>L

[a] Total SCAS score corrected for items that have a social phobia content.
[b] Evaluating the differences between the low, middle, and high behavioural inhibition groups.

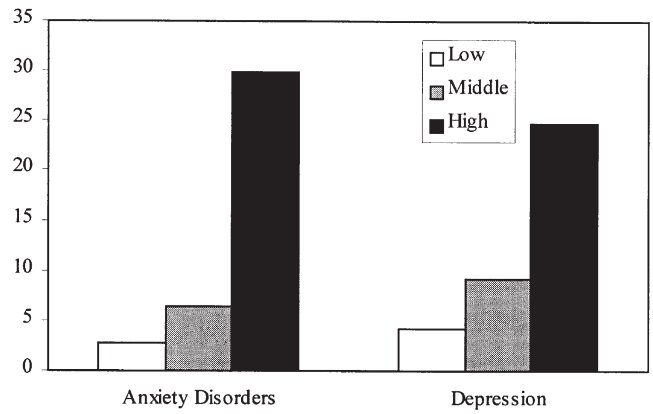

Fig. 1. Percentages of children in the low, middle, and high behavioural inhibition group exhibiting anxiety disorders (SCAS) and depression (CDI) scores in the (sub)clinical range.

inhibition had the highest anxiety/depression scores, whereas adolescents middle on behavioural inhibition scored in between.

3.4. Behavioural inhibition and anxiety disorder/depression scores in the (sub)clinical range

Cut-off scores reported in previous studies (30 for the SCAS, see Muris, Schmidt, & Merckelbach, 2000, and 14 for the CDI, see Saylor, Finch, Spirito, & Bennett, 1984) were used to identify adolescents who exhibited anxiety disorders and depression scores in the (sub)clinical range. Next, the three behavioural inhibition groups were compared to each other in terms of the percentage of adolescents scoring in the (sub)clinical range of SCAS and CDI. This was done by means of χ^2 tests. As can be seen in Fig. 1, the highest percentages of adolescents with subclinical SCAS and CDI scores were found in the high behavioural inhibition group, the lowest percentages were observed in the low behavioural inhibition group, whereas the percentages in the middle behavioural inhibition group fell in between [$\chi^2(2)$ values were 66.5, $P<0.001$ for SCAS and 30.1, $P<0.001$ for CDI].

3.5. The role of behavioural inhibition in the radicalisation of anxiety and depression

Structural equations modelling revealed that the first model (BI→Anxiety and Depression) and the fourth model (Anxiety→BI→Depression) provided poor fits for the data: χ^2 values were significant, AASRs>0.10, CFIs<0.50, and AIC values>300. The fit of model 3 (BI→Depression→Anxiety) was also insufficient: χ^2=104.4, $P<0.001$, AASR=0.08, CFI=0.81, and AIC=96.6. Only the second model in which behavioural inhibition leads to anxiety, which in turn results in depression (see Fig. 2), provided a good fit for the data. All goodness-of-fit

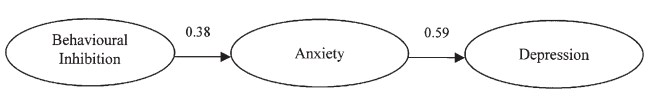

Fig. 2. Schematic representation of the most plausible model on the role of behavioural inhibition in the radicalisation of childhood anxiety and depression.

indices found for this model were satisfactory: the χ^2 value of 0.1 was non-significant (P=0.79), AASR=0.02, and CFI=0.94. In addition, this model had the lowest AIC value: 7.8.

4. Discussion

Behavioural inhibition is a temperamental factor characterised by shyness, fearfulness, and withdrawal in response to novel and/or unfamiliar social situations (Kagan et al., 1988). In the past decade, a number of studies have provided evidence for behavioural inhibition being a risk factor for developing anxiety disorders (for reviews, see Biederman et al., 1995; Turner et al., 1996). Most of these studies relied on samples of pre-school children in which behavioural inhibition was assessed by means of standardised laboratory observations. In the current study, behavioural inhibition was measured in 12–18-year-old adolescents by means of self-report. While it is not known how self-reported behavioural inhibition relates to laboratory-assessed behavioural inhibition, the present findings were consistent with those of previous studies in which behavioural inhibition was measured in the laboratory. That is, adolescents who defined themselves as high on behavioural inhibition were found to display higher levels of anxiety disorders symptoms than adolescents who defined themselves as low or middle in behavioural inhibition. In a similar vein, adolescents high on behavioural inhibition more frequently exhibited anxiety disorders symptoms in the (sub)clinical range. Taken together, the present study replicated the results of our previous study on the connection between self-reported behavioural inhibition and anxiety disorders symptoms in children and adolescents (Muris et al., 1999).

The current data are in line with the notion that behavioural inhibition is a vulnerability factor for anxiety disorders. Alternatively, the results also underline a point that was raised in Section 1. That is, behavioural inhibition is not the only factor associated with the development of anxiety problems. More specifically, the majority of the adolescents in the high behavioural inhibition group (70.1%) did not display anxiety disorders symptoms in the (sub)clinical range, whereas a substantial minority of the adolescents in the middle and low behavioural inhibition groups (9.2%) did report high levels of anxiety disorders symptoms. Interestingly, these figures come very close to those obtained in a recent prospective study by Prior, Smart, Sanson, and Oberklaid (2000), who investigated the relationship between shy temperament and anxiety disorders in an adolescent community sample. These authors found that 42% of the shy adolescents had anxiety problems compared with 11% of the adolescents who had not been classified as shy.

In the discussion of their comprehensive review on the role of behavioural inhibition in anxiety disorders, Biederman and colleagues (1995) have proposed that behavioural inhibition might also be antecedent to childhood depression. On the one hand, the current study found support for this idea. That is, adolescents high on behavioural inhibition displayed higher levels of depression than adolescents low or middle on behavioural inhibition (see also Muris et al., 1999). Moreover, a significantly higher rate of the adolescents in the high behavioural inhibition group displayed depression scores in the (sub)clinical range. On the other hand, structural equations modelling yielded no evidence of a direct link between behavioural inhibition and depression. More precisely, only the model in which behavioural inhibition results in anxiety, which in turn leads to depression, provided a satisfactory fit for the data. This suggests that the connection between behavioural inhibition and depression is carried by anxiety. Note that this result is also in keeping

with the notion that childhood depression is primarily a consequence of high levels of anxiety (Cole et al., 1998).

Although several authors have put forward the idea that behavioural inhibition should be viewed primarily as a risk factor for social phobia (Hayward, Killen, Kraemer, & Taylor, 1998; Mick & Telch, 1998), most researchers converge on the notion that behavioural inhibition acts as a non-specific risk factor for anxiety (e.g. Turner et al., 1996). The present findings seem to underline this idea. That is to say, behavioural inhibition was found to be associated with a wide range of anxiety disorders symptoms even with symptoms which did not have a social phobia content (e.g. generalised anxiety disorder, panic disorder and agoraphobia, fears of physical injury).

In the current study, girls defined themselves more frequently as middle or high on behavioural inhibition than boys did (see also Muris et al., 1999). Although there are some indications in the literature that extreme shyness is more common among girls than among boys, little is known about gender differences in behavioural inhibition. Meanwhile, epidemiological studies have shown that girls more frequently suffer from anxiety disorders than boys do (for a review, see Costello & Angold, 1995). If one is willing to accept the idea that behavioural inhibition is as a risk factor for anxiety disorders, it is not surprising that this temperamental trait is more frequently observed in girls than in boys.

It is important to note that the present research suffers from several limitations. First, the study relied on a self-report measure of behavioural inhibition. Although previous studies (e.g. Reznick, Hegeman, Kaufman, & Woods, 1992; Muris et al., 1999) have provided support for the usefulness of such measures, it remains to be established whether self-reports of behavioural inhibition correlate with parent reports and laboratory-assessed behavioural inhibition. Second, cut-off scores based on normative data of SCAS and CDI were employed to define adolescents suffering from (sub)clinical levels of anxiety and depression. Of course, the use of a standardised diagnostic interview would yield a more valid picture of the percentages of high behavioural inhibition adolescents who suffer from clinical manifestations of anxiety disorders and depression. Third, the present study was cross-sectional in nature. Although our structural equations modelling approach provided a tentative picture of the temporal links between behavioural inhibition, anxiety, and depression, a longitudinal set-up will be necessary to further establish the precise connections between behavioural inhibition and these psychopathological conditions in children and adolescents.

Acknowledgements

Children, parents, and staff of the Groenewald–Proosdijveld Scholengemeenschap in Stein/Beek (Limburg), The Netherlands, are thanked for their participation in this study.

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